activity with increasing pH, presumably due to a shift in the equilibrium of the tautomeric system resulting in the increased formation of the sodium salt of β-hydroxyacrolein. Evidence supporting the coupling of phosphorylation to the oxidative metabolism of malondialdehyde has been obtained from experiments using radioactive (^{32}P)phosphate.

A sex difference, in which the rate of aldehyde-stimulated oxygen uptake by mitochondria isolated from female rat livers was much greater, confirms previously observed effects with hepatic aldehyde oxidase preparations (Deitrich, 1966).

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Malate Oxidation by Tomato Fruit Mitochondria

By G. E. Hobson. (*Glasshouse Crops Research Institute, Rustington, Littlehampton, Sussex, U.K.*)

Intact particles from the outer walls of tomato fruit have been shown to retain the property of respiratory control during the oxidation of tricarboxylic acid-cycle intermediates. In these circumstances the oxidation of these substrates is stimulated by ADP (State 3 according to Chance & Williams, 1955) and then decreases as ADP becomes limiting (State 4). A gradual improvement in both respiratory control and ADP/O uptake ratios has been demonstrated up to incipient ripeness; thereafter the ratios decrease with advancing senescence of the fruit (Hobson, 1970).

Green tomatoes at any stage during development yield particles that oxidize malate rapidly after the addition of a small quantity of ADP, but subsequent additions of the nucleotide are progressively less effective. Exogenous supplies of thiamin pyrophosphate increase the rate of malate oxidation on ADP addition, and constant respiratory control ratios are produced as successive amounts of phosphate acceptor are made available.

Mitochondria from tomatoes during ripening become progressively less dependent on exogenous thiamin pyrophosphate for the production of constant respiratory control ratios after a series of ADP additions, but added cofactor continues to stimulate the oxidation of malate. In addition, the State 4 rate immediately after the display of respiratory control slowly increases with time to a constant value. It has been found that in the presence of added CoA this initial inhibition in State 4 disappears and the rate remains linear.

The progressive decrease in the stimulation of malate by ADP on mitochondria from green fruit is probably due to oxaloacetate accumulation, which is counteracted by the presence of thiamin pyrophosphate. The higher rate of malate oxidation by particles from ripening tomatoes leads to greater oxaloacetate production, the further metabolism of which is dependent on the availability of thiamin pyrophosphate. It appears likely that oxaloacetate concentrations reach such a value at the end of the State 3 oxidation period that the initial part of the subsequent State 4 is inhibited. Since CoA prevents this, it would appear that this cofactor is present in limiting quantities when malate oxidation is rapid. Thus not only the concentrations of the various cofactors but possible changes in susceptibility of the oxidative system to both oxaloacetate and thiamin pyrophosphate (Hulme & Rhodes, 1968) may have important bearings on the onset of the climacteric respiration rise and the ripening processes.

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Phosphorylation Associated with Cyanide-Insensitive Respiration in Plant Mitochondria

By S. B. Wilson. (*Botanical Laboratories, School of Biology, University of Leicester, Leicester LE1 7RH, U.K.*)

Isolated plant mitochondria possess a variable proportion of their respiration that is not inhibited by cyanide or antimycin A (Bonner, 1961). It has been suggested that the cyanide-insensitive respiration utilizes an alternative oxidase system that bypasses phosphorylation sites II and III (Storey & Bahr, 1969). Reversal of electron transport but not phosphorylation has been observed in plant mitochondria with succinate as substrate in the presence